

DOC.
W 1.35:
9-1547

BOOKSTACKS-
DOCUMENTS

TM 9-1547

WAR DEPARTMENT

TECHNICAL MANUAL



ORDNANCE MAINTENANCE

**MOUNT, TELESCOPE, M16; QUADRANT,
RANGE, M3; TELESCOPE, ELBOW, M5**

November 13, 1941

THE LIBRARY OF THE
DEC 30 1941
UNIVERSITY OF ILLINOIS

THE LIBRARY OF THE
DEC 30 1941
UNIVERSITY OF ILLINOIS

TM 9-1547

1-2

TECHNICAL MANUAL }
No. 9-1547

WAR DEPARTMENT,
WASHINGTON, November 13, 1941.

ORDNANCE MAINTENANCE

MOUNT, TELESCOPE, M16; QUADRANT, RANGE, M3;
TELESCOPE, ELBOW, M5

Prepared under direction of the
Chief of Ordnance

	Paragraph
General.....	1
Description.....	2
Operation.....	3
Inspection.....	4
Maintenance and repair.....	5
Care and preservation.....	6
APPENDIX. List of references.....	Page 27

1. **General.**—*a. Purpose.*—This manual is published primarily for the information and guidance of ordnance maintenance personnel.

b. Scope.—This manual supplements the Technical Manuals which are prepared for the using arm. It contains descriptive matter and illustrations sufficient to provide a general working knowledge of the equipment and detailed instructions for inspection, maintenance, and repair by ordnance maintenance personnel.

2. **Description.**—*a. General.*—(1) The telescope mount M16, panoramic telescope M1, range quadrant M3, and elbow telescope M5 constitute the sighting equipment of a fire-control system for the 75-mm howitzer carriage M2A1, M3, or M3A1. The panoramic telescope M1 when attached to the telescope mount M16 forms the sighting element for laying the howitzer in azimuth. The range quadrant M3 forms the elevation indicating element for laying the howitzer in elevation. The elbow telescope M5 furnished with the range quadrant M3 is used as a direct aiming instrument at target ranges varying from 400 to 3,000 yards. When the elbow telescope is used, the settings of the range quadrant are disregarded.

(2) The telescope mount M17, elbow telescope M41, and range quadrant M2 used on the 75-mm howitzer carriage M2 are no longer required because the 75-mm howitzer carriage M2 has been changed

to M2A1 and will use the same sighting equipment as the 75-mm howitzer carriage M3 and M3A1.

b. Telescope mount M16 and panoramic telescope M1.—This telescope and mount is issued with each 75-mm howitzer and carriage M2A1, M3, or M3A1.

(1) *Telescope mount M16* (figs. 1 and 2).—This mount is of the compensating type, automatically applying the necessary corrections for trunnion cant.

(a) The elevating mechanism is contained in the elevating worm housing (D28590). The telescope is elevated or depressed by means of the elevating knob (A38167) which is secured to the elevating worm shaft. The elevating worm (A44006) meshes with the gear teeth cut on the outside of the cross level worm housing (C56553). A clamping screw is provided for clamping the elevating worm shaft in any position.

(b) The cross leveling mechanism is housed in the cross level worm housing (C56553, sec. B-B, fig. 2). Rotation of the cross level knob tilts the mount about the support pivot (A31371). The mount bracket (B135736) is pinned to the support (B135737) which is positioned on the gun cradle. The cross leveled position of the mount is indicated on the cross level vial (A31308), which is held in place by the cross level bracket (B16892) on the elevating worm housing (D28590).

(2) *Panoramic telescope M1* (figs. 3, 4, and 5).—This telescope is provided with mechanisms by which the line of sight may be directed on any object in a horizontal or vertical plane. The telescope is secured to the mount by four screws passing through drilled holes in the flange of the azimuth worm housing (C2534, fig. 5) and elbow retaining plate (B10212) of the telescope, and the housing (D28590, fig. 2) of the mount. The panoramic telescope is of the fixed focus type and has the following characteristics:

Power.....	3X.
Field of view.....	12°12'.
Diameter of exit pupil.....	0.15 inch.
Apparent field of view.....	36°36'.
Effective focal length of objective.....	2.362 inches.
Effective focal length of eyepiece.....	0.784 inch.

(a) The line of sight of the telescope is turned in azimuth by means of the azimuth mechanism. The azimuth scale attached to the lower part of the rotating head of the telescope is graduated in 64 equal spaces, numbered from 0 to 32, 0 to 32, and each space representing an angle of 100 mils. The azimuth micrometer is secured to the azimuth worm knob (A37677) and rotates with the

DOC.
W 1-35:
9-1547

azimuth worm (A37674). The circumference of the micrometer is graduated in 100 equal spaces numbered from 0 to 100, each space representing an angle of 1 mil. The azimuth worm throwout lever (A30865), when rotated and held against the action of the torsion spring (A30867), disengages the azimuth worm from the teeth of the worm gear, permitting free rotation of the rotating head.

(b) The elevating mechanism depresses or elevates the line of sight. The worm shaft of the elevating mechanism is provided with a series of stop rings (A49929) and (A49930) which prevent the worm from being damaged by unmeshing. The elevation micrometer (A37665) is secured to the elevating knob (A30923) and is marked with a zero line which indicates the normal position of the line of sight. A line is marked on the open sight side of the rotating head to be used with the zero line on the body of the rotating head when setting the elevation micrometer to indicate the normal position. An open sight attached to the rotating head cover (A37671) is used to obtain preliminary direction of sight.

(c) The reticle (A37950) of the telescope is inscribed with a vertical and a horizontal line, the intersection of which indicates the optical axis of the telescope. The eyepiece, fitted with a soft rubber eyeshield (A39125) can be rotated about the vertical axis of the telescope. Such rotation of the eyepiece does not change the direction of the line of sight.

c. Range quadrant M3.—This range quadrant (figs. 6, 7, 8, and 9) and elbow telescope M5 are issued with the 75-mm howitzer carriage M2A1, M3, or M3A1. The range quadrant is secured to the gun carriage by means of the range quadrant support.

(1) The elevating mechanism is contained in the elevating worm housing (D28690, fig. 7). Rotation of the elevating worm knob (A31357) elevates or depresses the line of sight by rotating the elevating worm housing (D28690) to which the telescope is attached. The range drum (D28691, fig. 7) and the elevating knobs (A31357) are secured to the elevating worm (B136398). The range drum is graduated for different kinds of ammunition. The helical groove in the drum moves the index (A45946) as the drum is revolved to indicate the fuze range for any elevation. The elevation micrometer (A45942) attached to the shaft of the elevating worm is graduated into 100 equal spaces, each representing 1 mil. The elevation scale (A44048) is graduated into 100-mil intervals.

(2) The angle of site mechanism is inclosed in the upper part of the elevating worm housing. This mechanism is actuated by rotating the angle of site knob (A32087). The angle of site micrometer

(A44051) attached to the angle of site knob is graduated into 100 equal spaces, each representing 1 mil. This micrometer is used in conjunction with the angle of site scale (A44049, fig. 6) which is graduated in increments of 100 mils, the "3" graduation indicating the normal position of the line of sight. The angle of site level vial (A31308, fig. 8) provides a horizontal datum plane for the line of sight.

(3) The cross level mechanism tilts the range quadrant about the pivot (A31371, fig. 8) of the bracket (C56777). This bracket is secured to the support which is positioned in the gun cradle. The cross level mechanism is actuated by means of the cross level knob (A36349) which is attached to the cross level worm (A36344). The cross level vial (A31308, sec. D-D, fig. 8) is used to indicate the cross leveled position.

(4) The azimuth mechanism is actuated by the azimuth worm knob (A36349, fig. 9). The lateral motion of the telescope is controlled by this knob. Indexes are provided on the range quadrant, bracket (C56777), and on the worm gear segment (C56778) to be used when setting the telescope to the normal or zero position.

d. Elbow telescope M5 (figs. 10 and 11).—This elbow telescope is a three-power aiming instrument having a field of view of $13^{\circ}20'$ and an exit pupil diameter of 0.3 inch. The optical system produces an erect image.

(1) The reticle (C56771) is etched with a series of alternate long and short horizontal lines which are interrupted for a distance of 0.010 inch either side of the vertical axis. The long lines are numbered from 4 to 30, representing ranges of 400 to 3,000 yards. The "N" graduation is used in collimating and indicates the line of sight parallel to a horizontal plane through the bore of the howitzer.

(2) The telescope is held in position by a clamp (B136438) on the range quadrant M3. This clamp is machined so that the howitzer is elevated $3^{\circ}42'$ when the optical axis of the telescope is horizontal.

3. Operation.—*a. Telescope mount M16 with panoramic telescope M1.*—This telescope mount and panoramic telescope are bolted together in assembly and operate as a single unit. The operation is essentially the same for both direct and indirect fire.

(1) *Direct fire.*—(a) Set the panoramic telescope in elevation to "normal" and leave in this position as long as direct fire is used.

(b) Set the lateral deflection to the desired value, using the combined indications on the azimuth scale (100-mil steps) and on the azimuth micrometer (1-mil steps). Large deflection may be set in by releasing the throwout lever.

(c) Operate the cross leveling knob of the telescope mount so that the bubble of the cross level vial is continuously centered with respect to the graduations on the vial. Operate the elevating knob of the telescope mount so the horizontal cross line of the panoramic telescope reticle remains continuously on the target. Disregard the angle of site level.

(2) *Indirect fire.*—(a) Set the firing angle to the desired value, using the combined indications on the azimuth scale (100-mil steps) and azimuth micrometer (1-mil steps). The azimuth worm may be disengaged for making large settings in azimuth by means of the azimuth throwout lever.

(b) Operate the angle of site and cross leveling knobs of the telescope mount so the bubbles of both level vials are continuously centered with respect to the graduations on the vials.

(c) Operate the traversing handwheel on the howitzer carriage so that the vertical cross line of the panoramic telescope reticle remains continuously on the aiming point. The telescope may be elevated or depressed by the knob at the top as required to bring the aiming point within the field of view.

b. Range quadrant M3.—The operation of the range quadrant is the same for both direct and indirect fire. Three methods of operation may be employed.

(1) *By setting off the quadrant elevation in mils by means of elevation micrometer (A45942, fig. 7) and elevation scale (A44048, fig. 6).*—(a) Set the “3” graduation on the angle of site scale (A44049, fig. 6) and the zero on the angle of site micrometer (A44051) opposite their respective indexes. Rotate the elevating knob (A31357, fig. 7) until the desired quadrant elevation setting is indicated on the elevation scale and associated micrometer.

(b) Elevate the howitzer until the bubble in the angle of site level vial is centered and at the same time keep the bubble in the cross level vial centered by means of the cross level knob (A36349, fig. 8).

(2) *By setting off quadrant elevation in mils by combining angle of site in mils and angle of elevation in mils.*—(a) Set off the angle of site by revolving the angle of site knob until the desired angle of site setting is indicated on the angle of site micrometer and angle of site scale. Turn the elevating knob until the desired elevation setting is indicated on the elevation micrometer and elevation scale opposite their respective indexes.

(b) Elevate the howitzer until the bubble in the angle of site level is centered. Keep the bubble in the cross level vial centered by turning the cross level knob.

(3) *By setting off quadrant elevation by combining angle of site in mils and range in yards.*—(a) Set off the angle of site as described in (2) above. Rotate the elevating worm knob until the desired range setting is indicated on the range drum opposite its index (A45946).

(b) Elevate the howitzer until the bubble in the angle of site level is centered. Keep the bubble in the cross level vial centered by means of the cross level knob.

c. Elbow telescope M5.—The elbow telescope is used as a direct aiming instrument at target ranges varying from 400 to 3,000 yards. In this method of operation the settings of the range quadrant are disregarded. The howitzer is laid in elevation by turning the carriage elevating handwheel until the desired range line in the telescope reticle falls on the target. If large lateral deflections are being applied, the range quadrant azimuth worm knob (A36349) may be used in order to bring the target within the field of view. When using aimed fire, the angle of elevation is introduced by means of range graduations on the telescope reticle and the angle of site is introduced directly.

4. Inspection.—Inspection is for the purpose of determining the condition of the matériel, whether repairs or adjustments are required, and the remedies necessary to insure serviceability and proper functioning. The following list will serve as a guide:

<i>Parts to be inspected</i>	<i>Points to be observed</i>
<i>a.</i> External screws, knobs, clamping screws, and nuts.	<i>a.</i> Examine the equipment as a whole for loose and missing parts such as screws, nuts, and knobs.
<i>b.</i> Level vials.	<i>b.</i> See that the angle of site and cross level vials are not broken and that they are secure in their housings.
<i>c.</i> Mount elevating mechanism.	<i>c.</i> Operate the elevating knob (A38167, sec. A-A-A-A, fig. 2) until the stops are approached in each direction. Observe any sticking or binding in the mechanism.
<i>d.</i> Mount cross-leveling mechanism.	<i>d.</i> Operate the cross-leveling knob (A36349, sec. B-B, fig. 2) until the stops are approached in each direction.

Parts to be inspected

Points to be observed

e. Telescope mount, angle of site level vial alinement.

Observe any binding or sticking in the mechanism.

f. Range quadrant angle of site and elevating mechanisms.

e. When the telescope mount support is set vertical and the flat surface of the elevating worm housing (D28590) which supports the telescope is set horizontal, then the bubble in the angle of site level vial should be centered. If the bubble is not centered an adjustment of the level vial is indicated.

g. Backlash in range quadrant angle of site mechanism.

f. Operate the elevating knob (A31357, sec. B-B-B-B, fig. 7) and the angle of site knob (A32087) until the stop limits are approached in each direction. Note any binding or sticking in the mechanism.

g. Center the bubble in the angle of site level vial by turning the angle of site knob (A32087, sec. B-B-B-B, fig. 7) in one direction. Record the reading of the index on the angle of site scale and the index on the associated micrometer. Turn the angle of site knob several revolutions farther in the same direction. Then center the bubble again by turning the angle of site knob in the opposite direction. Again record the reading of the index on the angle of site scale and the index on the associated micrometer. The difference between the initial and final readings is the backlash. If the difference between the initial and final readings is greater than 2 mils, adjustment or replacement of wearing parts is necessary. If the backlash of the instrument cannot be adjusted to 1 mil with the facilities available, it should be returned to a base shop for overhaul.

<i>Parts to be inspected</i>	<i>Points to be observed</i>
h. Backlash in range quadrant elevating mechanism.	h. Center the bubble in the angle of site level vial by turning the elevating knob (A31357, fig. 7) in one direction. Record the reading of the index on the elevation scale (A44048) and the index on the elevation micrometer (A45942, fig. 7). Turn the elevating knob several turns farther in the same direction. Then center the bubble in the angle of site vial by turning the elevating knob in the opposite direction. Again record the reading of the index on the elevation scale and the index on the associated micrometer. The difference between the initial and final readings is the backlash. If the difference between the initial and final reading is greater than 2 mils, adjustment or replacement of wearing parts is necessary. If the backlash of the instrument cannot be adjusted to 1 mil with the facilities available, it should be returned to a base shop for overhaul.
i. Range quadrant elevation scale and angle of site level alinement.	i. With the support (B136400, sec. A-A, fig. 8) of the range quadrant vertical, set the elevation scale and associated micrometer to indicate zero opposite their respective indexes. Center the angle of site bubble by means of the micrometer knob (A32087). Then the angle of site index line should coincide with the "3" graduation of the angle of site scale and the index on the associated micrometer should coincide with zero. Lack of coincidence may be due to either the elevation scale and associated micrometer being out of adjustment or the angle of site scale and angle of site level being out of alinement.

<i>Parts to be inspected</i>	<i>Points to be observed</i>
j. Range drum (D28691, sec. B-B-B-B, fig. 7).	j. Set the elevation micrometer (A45942) to indicate 100 mils minus the jump angle value. (For a 0.6-mil jump angle, the setting should be 99.4 mils.) The range drum index (A45946) should then indicate zero on the range drum.

5. Maintenance and repair.—*a. Tools.*—An optical repair kit containing the necessary tools, fixtures, cements, oils, etc., for use with this equipment is furnished to ordnance maintenance companies. A complete list of the items comprising the kit is contained in a blueprint fastened to the cover of the chest. Every item in the kit is designated by a number equivalent to the compartment number. Most of the items, such as screw drivers, etc., require no description as their uses are self-explanatory. The collimating telescope No. 90 which is furnished with the kit is an ordinary nonerecting type. It is adjusted for parallax by focusing the eyepiece on the cross wires and then removing parallax by focusing the objective, temporarily loosening the drawtube clamping screw in the side of the telescope for the purpose. The magnifying power of the collimating telescope is 9.78X; the field of view is 4°20'.

b. Disassembly and assembly.—The assembled and sectioned views show the location of the various parts and the means by which they are held in place. These figures should be carefully studied before attempting any assembling or disassembling operations.

(1) *To disassemble telescope mount elevating worm (A44006, fig. 2).*—(a) Remove the elevating knob (A38167, fig. 2) by first removing the pin (BFCX1C) by which it is secured to the shaft. Slide the washer (44007) from the shaft.

(b) Unscrew the plunger plug (A31378A) and remove the plunger spring (A34447) with associated plunger (A31363). Loosen the clamping screw (A37437).

(c) Unscrew the ball cap (A32117) by first loosening the headless screw (BCUX1CC). Loosen the pivot point headless screw (A34659) and remove the elevating worm (A44006) together with the socket (A32122) from the elevating worm housing.

(2) *To disassemble telescope mount cross level worm (A36344).*—(a) Remove the cross level knob (A36349, sec. B-B, fig. 2) by first driving out the knob pin (BFCX1L). Slide washer (A44007) from the shaft.

(b) Unscrew the plunger plug (A34655) and remove the plunger spring (A31370) together with the plunger (A31369).

(c) Unscrew the ball cap (A37914) by first loosening the headless screw (BCUX1CC) which secures the ball cap in the housing. Loosen the socket screw (A34658) and remove the cross level worm (A36344) from the cross level worm housing (C56553).

(3) *To disassemble range quadrant angle of site worm (A44050, sec. B-B-B-B, fig. 4).*—(a) Loosen the headless screw (BCUX1CC) and unscrew the plunger plug (A34654). Remove the plunger spring (A33526) with plunger (A34100).

(b) Remove the angle of site knob (A32087) by first removing the micrometer nut (A32112). Remove the angle of site micrometer (A44051) and the felt washer (A44055). Extract the angle of site micrometer adapter (A32125) by first driving out the adapter pin (BFCX1B).

(c) Unscrew the ball cap (A37913) by first loosening the headless screw (BCUX1CC). Loosen the headless screw (A34658) which secures the socket (A32119) in the level vial housing (C56769). Unscrew the angle of site worm (A44050) and remove it together with the worm socket (A32119) from the level vial housing.

(4) *To disassemble range quadrant elevating worm (B136398, fig. 7).*—(a) Remove both elevating worm knobs (A31357) by removing the three flathead screws (BCLX3DF) from each. Slide off the elevation micrometer (A45942) and remove the felt washer (A45944). Drive out the adapter pin (BFCX1L) and remove the micrometer adapter (A45943) from the worm shaft.

(b) Unscrew the plunger plug (A31378A) by first loosening the plug screw (BCUX1CC). Remove the plunger spring (A34447) and plunger (A31363).

(c) Remove the adapter pin (BFCX1L) and slide off the adapter (A180916) together with the range drum (D28691). Extract the support pin (BFCX1L) and slide the support about an inch to the right (sec. B-B-B-B, fig. 7) on the worm shaft.

(d) Unscrew the ball cap (A45948) by first loosening the headless screw (BCUX1CC). Loosen the headless special screw (A34659). Unscrew the elevating worm (B16398) and extract it, together with the ball socket (A32122) from the elevating worm housing.

(5) *To disassemble range quadrant azimuth worm (B136437, fig. 9).*—(a) Loosen the headless screw (BCUX1CC) and unscrew the plunger plug (A31378). Remove the plunger spring (A34447) and plunger (A31363).

(b) Remove the azimuth knob (A36349) by first driving out the pin (BFCX1L). Loosen the screws (BCUX1CC and A34659). Unscrew the ball cap (A32117). Remove the elevating worm (B136437) together with the ball socket (A32122) from the bracket (C56777).

(6) *To replace level vials (sec. D-D, fig. 8).*—Since the procedure to be followed for replacement of the angle of site and cross level vials is similar, only the procedure for the angle of site level vial will be given.

(a) Remove the pin (BFDX1AK) and unscrew housing plug (A34055). Loosen each of the four level vial adjusting screws (BCUX2CB) and extract the angle of site level tube (B135743) from the housing.

(b) Remove the level vial by chipping the old plaster of paris from the level tube. Place the new level vial in the tube, locate the vial, and set with calcined gypsum (plaster of paris). When re-assembling, the adjusting screws should be tight before any of the pins or plugs are replaced.

(7) *To reassemble various parts.*—Reassembling will be done in the reverse order of the method used for disassembly. When re-assembling worm shafts fitted with socket and cap bearings, adjust the cap to provide a snug fit on the ball so that there is neither end play nor excessive friction.

c. *Adjustments.*—The procedure for verifying the adjustments on this matériel is explained in paragraph 4.

(1) *To adjust angle of site scale (A44049, fig. 6).*—Loosen the two roundhead screws (BCOX3CC) and shift the scale until the desired indication is opposite the index. Then tighten the screws.

(2) *To adjust angle of site micrometer (A44051, fig. 7).*—Loosen the micrometer nut (A32112). With one hand hold the angle of site knob stationary and with the other rotate the micrometer the required amount. Then tighten the micrometer nut.

(3) *To adjust elevation scale (A44048, fig. 6).*—Loosen the two roundhead screws (BCOX3CC) and shift the scale the desired amount. Then tighten the screws.

(4) *To adjust elevation micrometer (A45942, sec. B-B-B-B, fig. 7).*—Loosen the three flathead screws (BCLX3DF) and rotate the micrometer the required amount while holding the elevation knob (A31357) stationary. Then tighten the screws.

(5) *To adjust range drum (D28691 sec. B-B-B-B, fig. 7).*—Loosen the three flathead screws (BCLX3DF) which secure the range drum to the right elevating knob (A31357). Hold the knob stationary and

revolve the range drum until the desired indication is opposite its index. Then tighten the screws.

(6) *To adjust angle of site level vial (A31308, sec. D-D, fig. 8).—*This adjustment will ordinarily be necessary only when the angle of site scale adjustment is inadequate. Remove the level plug (A34055) by removing the associated pin (BFDX1AK). Access can now be had to the four level vial adjusting screws (BCUX2CB). Arrangement of these screws is such that a small lateral as well as vertical adjustment is permitted. When adjusting, one screw is screwed in and, at the same time, the one on the opposite side of the tube (B135743) should be backed out.

6. Care and preservation.—a. Handling.—(1) This equipment contains delicate mechanisms and accurately arranged optical parts and should be handled gently to avoid all unnecessary shocks, etc., which will eventually render the instrument unserviceable.

(2) Stops are provided to limit the various motions of the telescope mount and range quadrant. Avoid any attempt to operate these mechanisms past the stops.

(3) Keep the level vials covered with the covers provided when the levels are not being used.

(4) All nuts and screws should be kept tight at all times to insure proper functioning of the equipment.

(5) Wipe off all oil and grease that seeps from the bearings to prevent the accumulation of dust and grit.

(6) The rubber eyeshield should be washed periodically in lukewarm water.

b. Care of optical parts.—(1) To obtain satisfactory vision it is necessary that the exposed surfaces of the lenses and other optical parts be kept clean and dry. Corrosion and etching of the surface of the glass, which greatly interfere with the good optical qualities of the instrument, can be prevented or greatly retarded by keeping the glass clean and dry.

(2) Under no conditions will polishing liquids, pastes, or abrasives be used for polishing lenses and windows.

(3) For cleaning optical glass use only paper, lens, tissue. To remove dust, brush the glass lightly with a clean camel's-hair brush and rap the brush against a hard body in order to knock out the small particles that cling to the hairs. Repeat this operation until all dust is removed.

(4) Moisture due to condensation may collect on the optical parts of the instrument when the temperature of the parts is lower than that of the surrounding air. This moisture can be removed by the

application of gentle warmth. Heat from strongly concentrated sources should never be applied directly as it may cause unequal expansion of parts resulting in breakage of optical parts or inaccuracies in observation.

(5) Exercise particular care to keep optical parts free from oil or grease. Do not wipe the lenses or windows with the fingers. To remove oil or grease from optical surfaces, apply ethyl alcohol with a clean camel's-hair brush and rub gently with clean lens paper. If alcohol is not available, breathe heavily on the glass and wipe off with clean lens paper; repeat this operation several times until clean.

c. Lubrication.—(1) The interior moving parts of the telescope mount M16 are lubricated when assembled. Additional lubrication is required as follows:

(a) The cross level worm housing (C56553, sec. A-A-A-A, fig. 2) should be oiled sparingly through oil cup provided.

(b) At periodic intervals the threads of the clamping screw (A37437) should be lubricated with oil.

(c) The telescope mount support (B135737) should periodically be coated lightly with grease.

(2) The interior moving parts of range quadrant M3 are lubricated when assembled. Additional lubrication is required as follows:

(a) The angle of site worm (A44050, sec. B-B-B-B, fig. 7) should be oiled sparingly through oil cup provided.

(b) The range quadrant support (B136400) and the locating surfaces of the range quadrant should periodically be lightly coated with grease.

(c) The threads of the telescope clamp clamping bolt (A46593) and the helical groove of the range drum should be lubricated lightly with oil.

(3) The authorized lubricants to be used are—

(a) Oil, lubricating for aircraft instruments and machine guns.

(b) Grease, special, low temperature. This lubricant is used where a soft or medium grease is required.

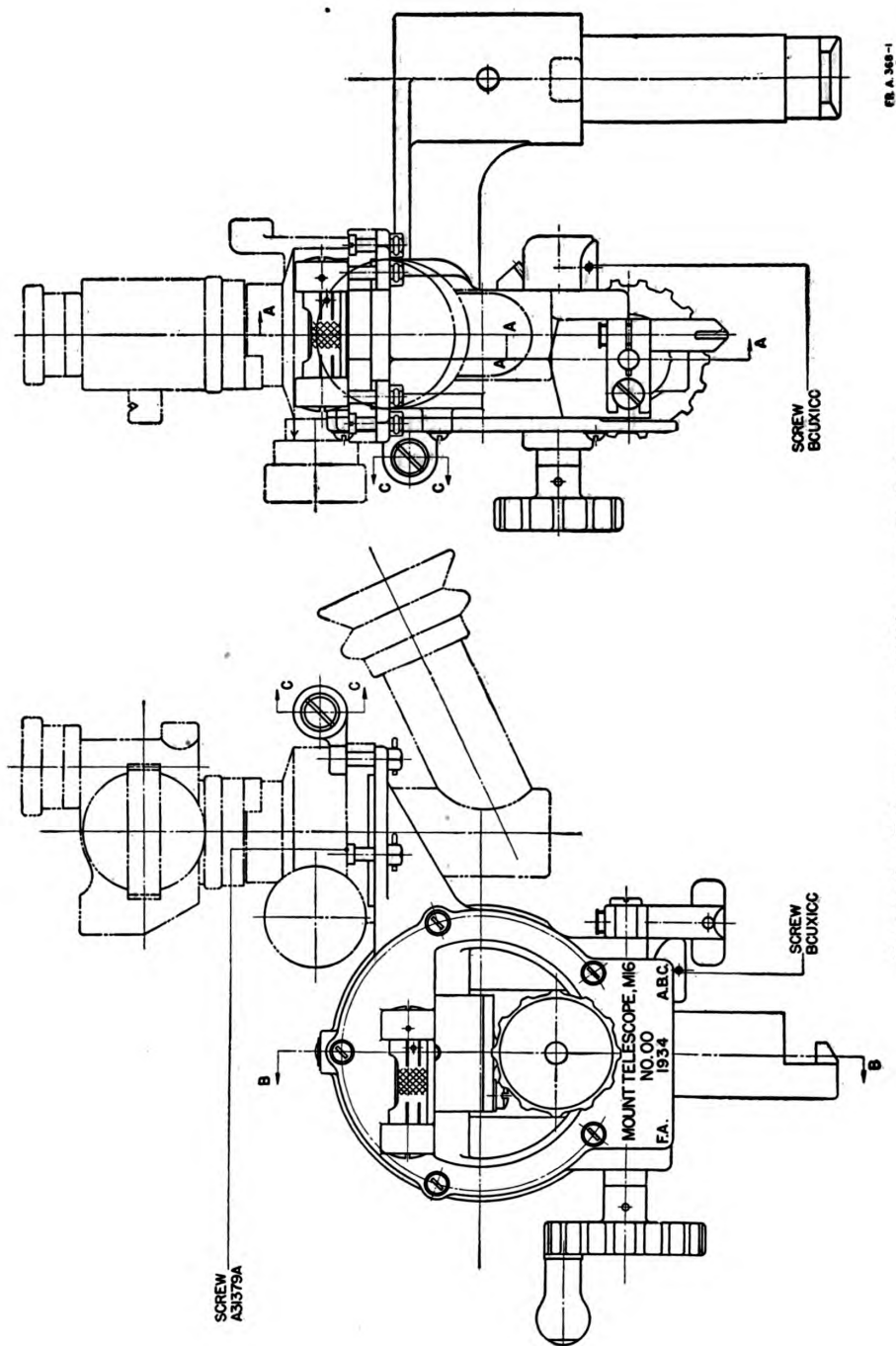


FIGURE 1.—Telescope mount M16—assembled views.

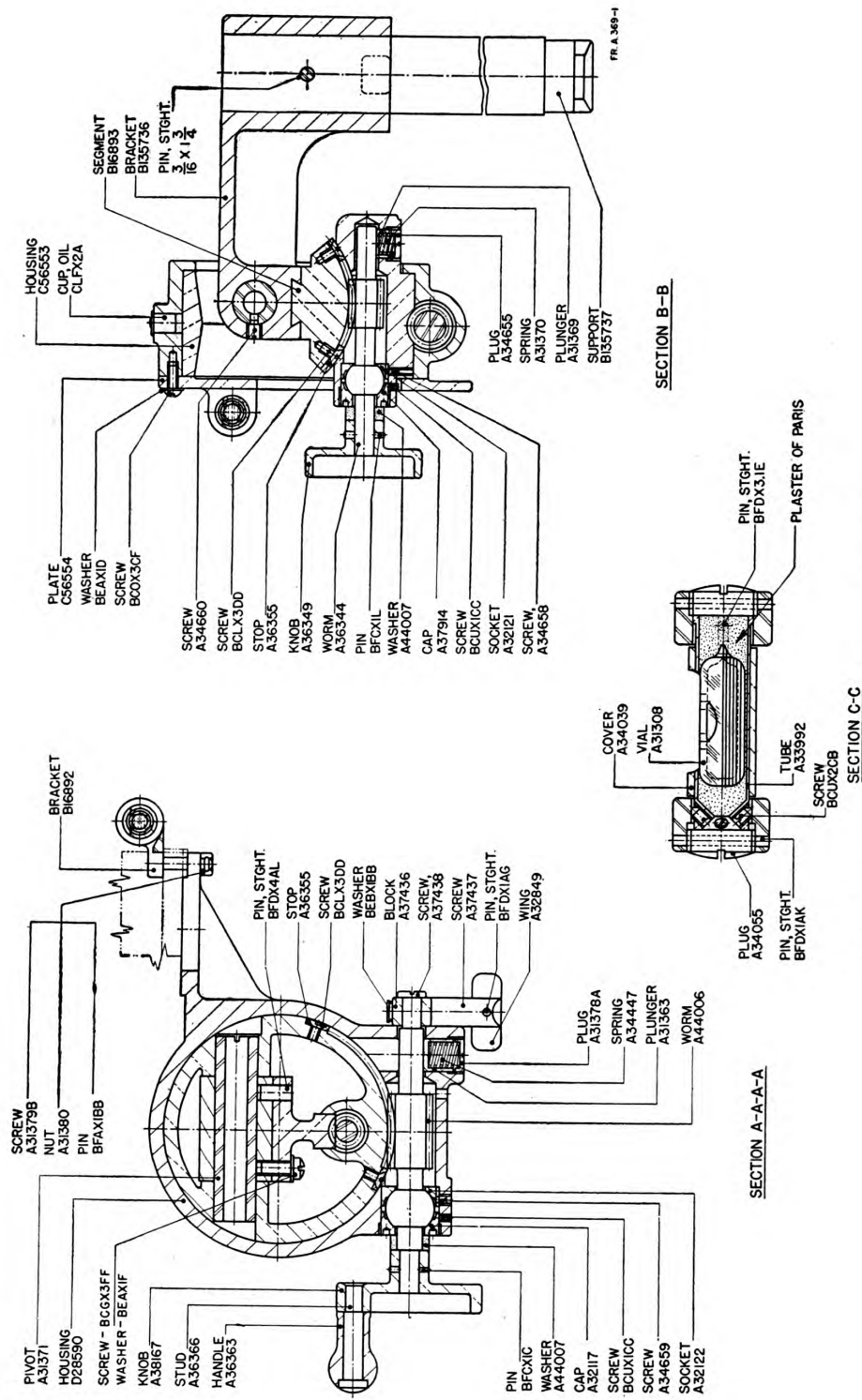


FIGURE 2.—Telescope mount M16—sectioned views.

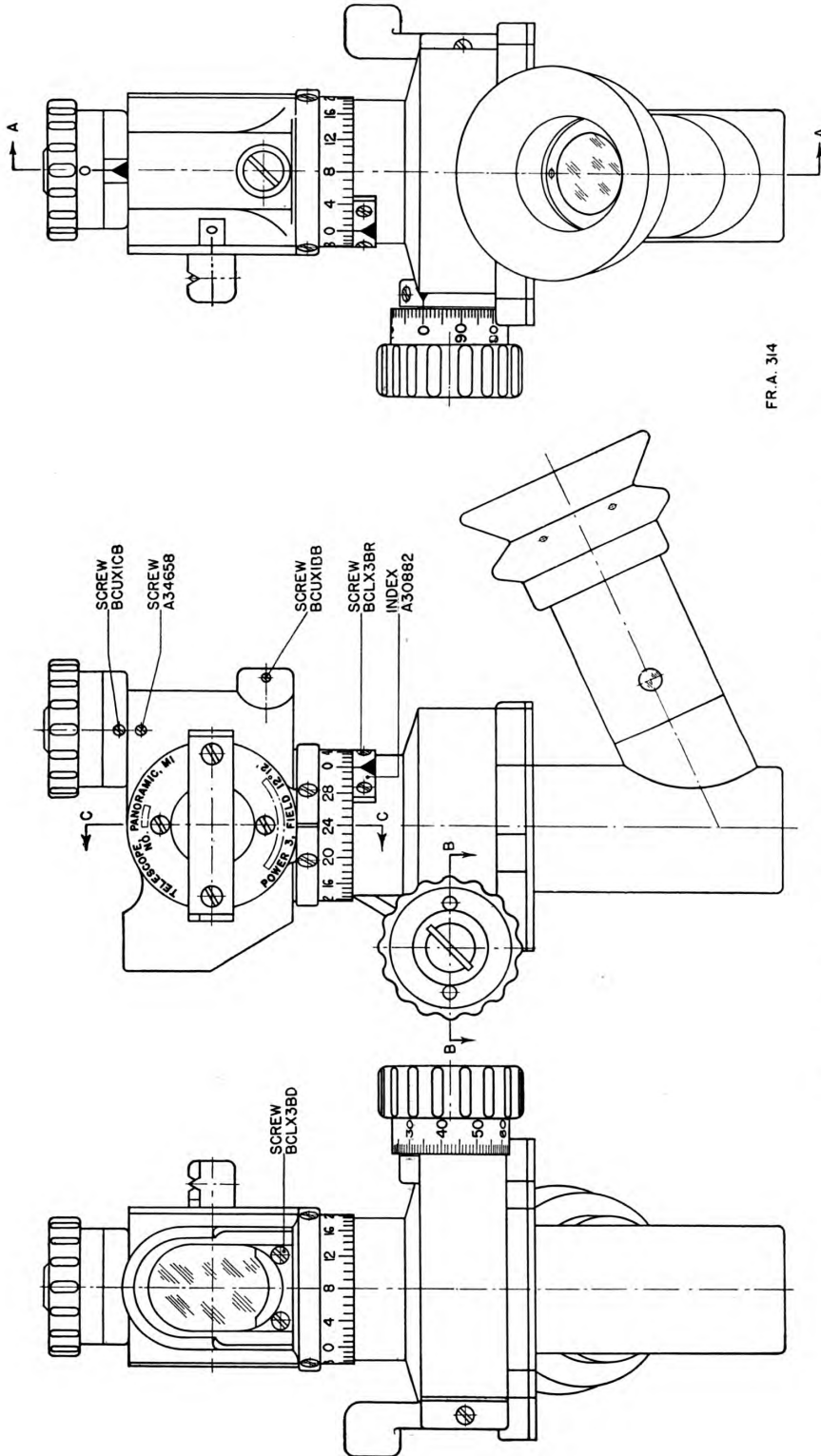


FIGURE 4.—Panoramic telescope M1—assembled and sectioned views.

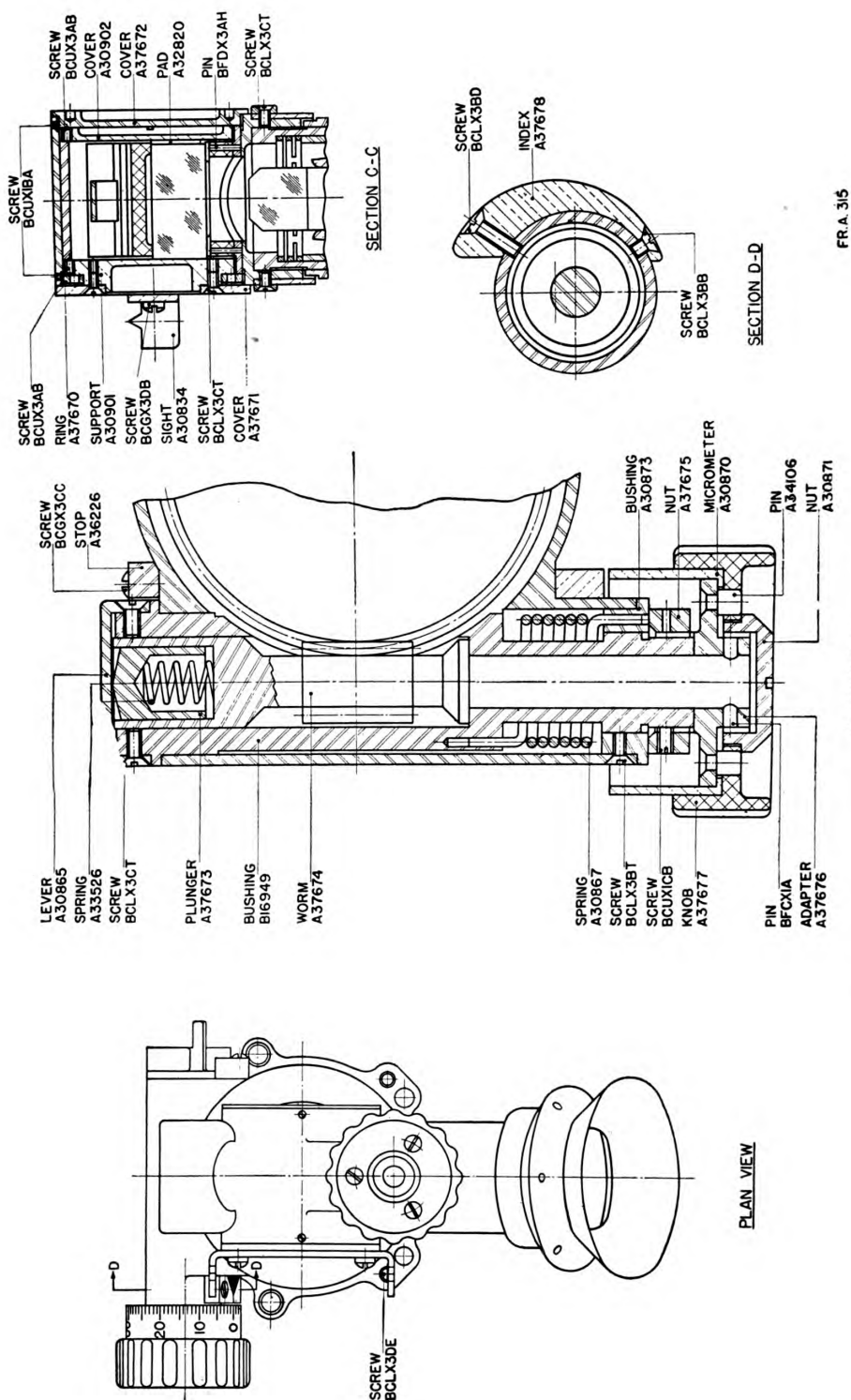
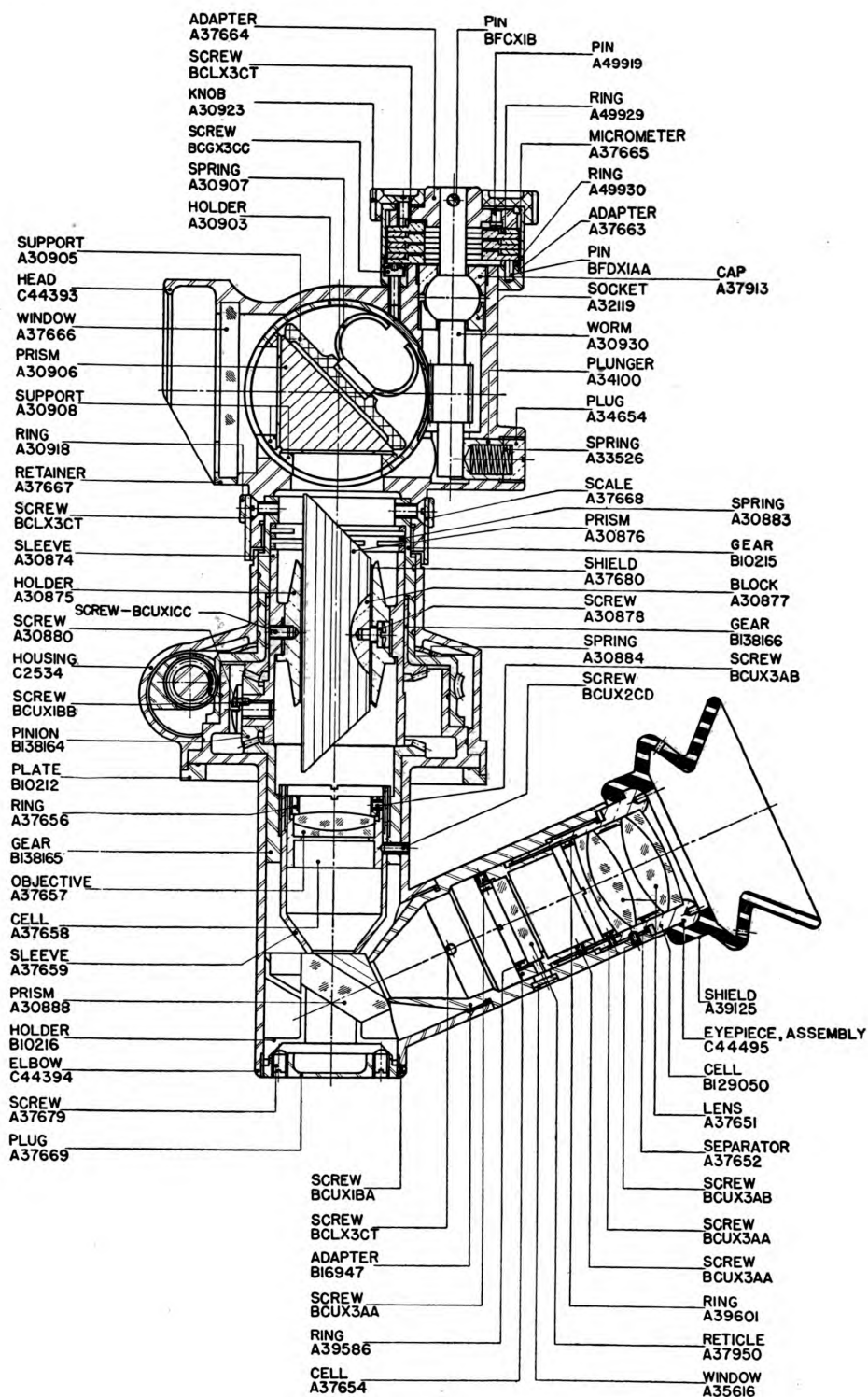


Figure 3.—Panoramic telescope M1—assembled views.



SECTION A-A

FR. A. 316-1

FIGURE 5.—Panoramic telescope M1—sectioned view.

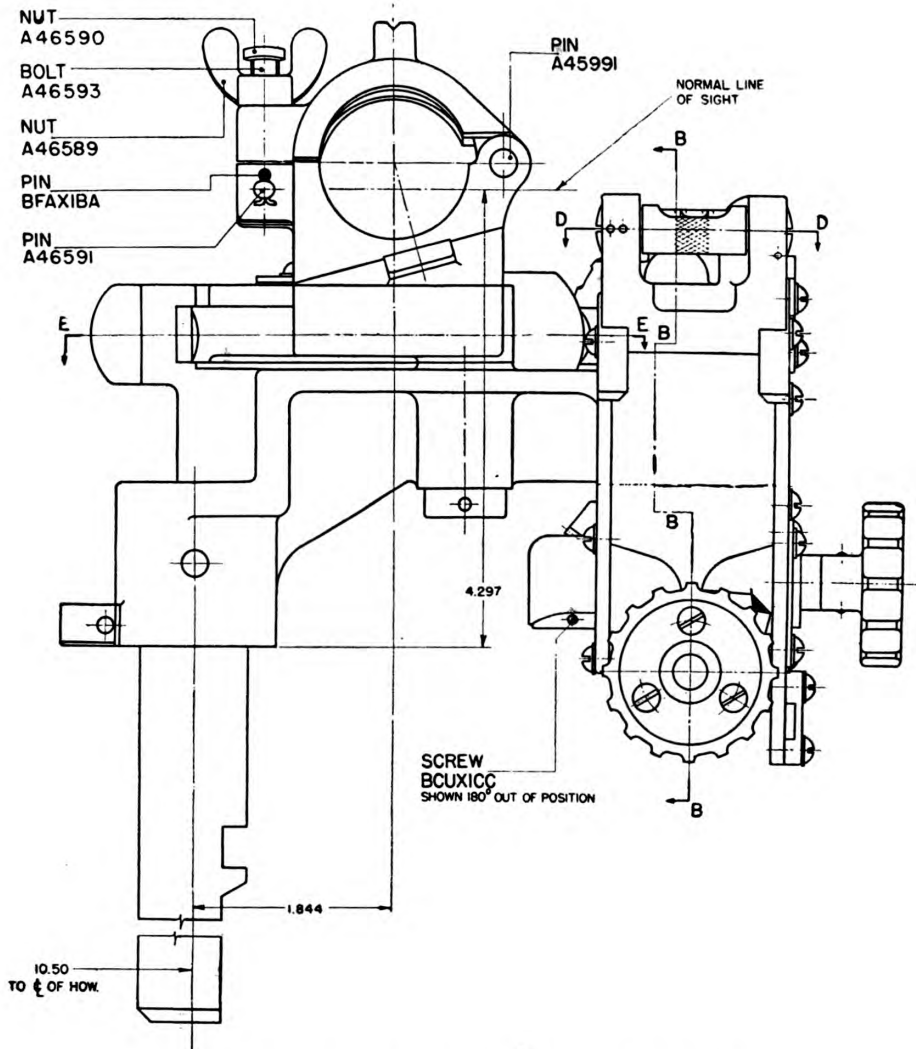


FIGURE 6.—Range quadrant M3—assembled views.

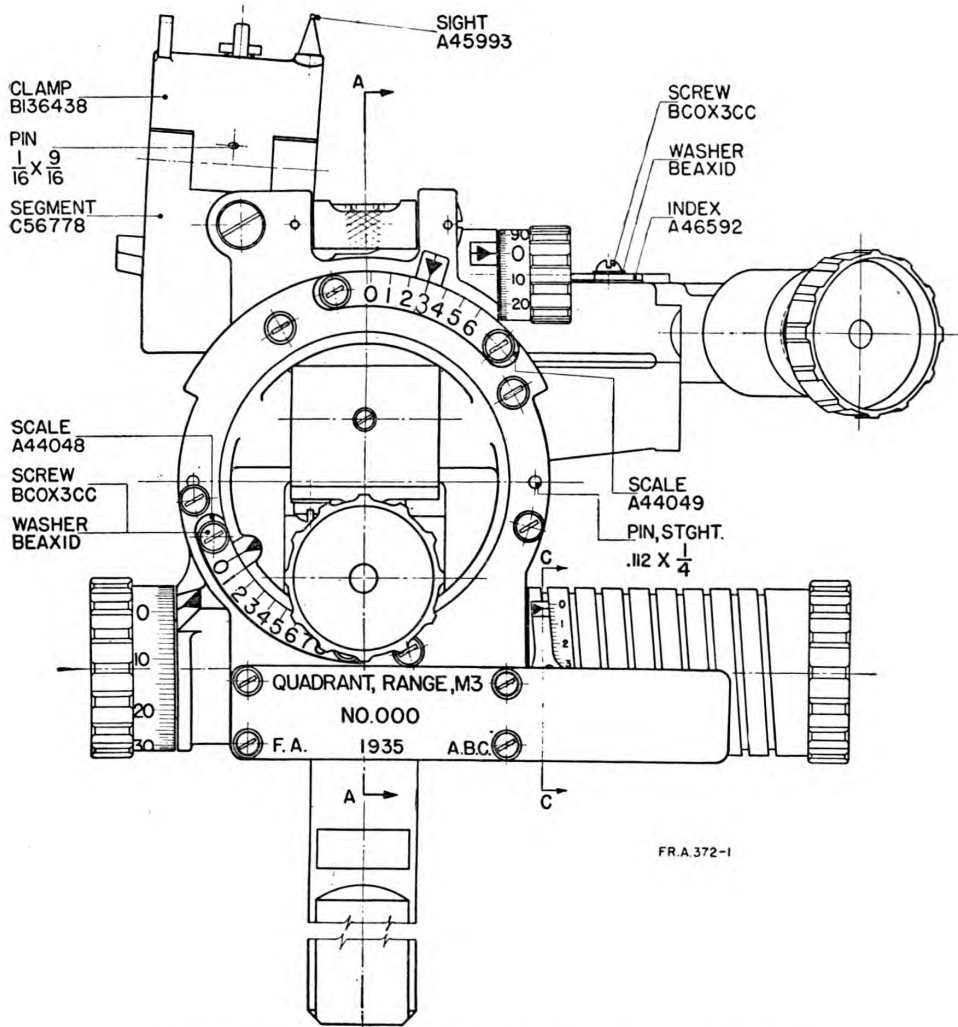


FIGURE 6.—Range quadrant M3—assembled views—Continued.



FIGURE 7.—Range quadrant M3—sectioned views.

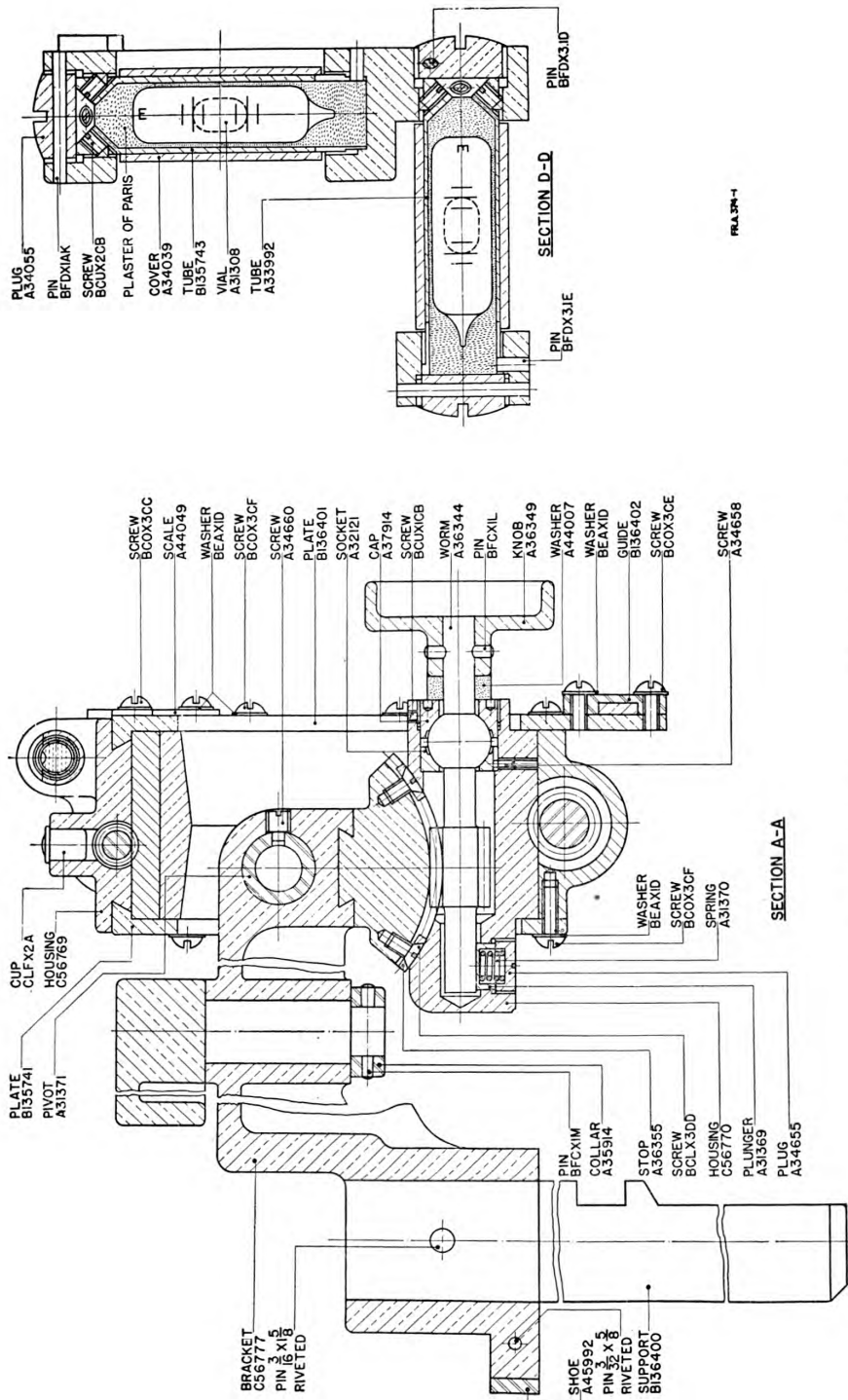
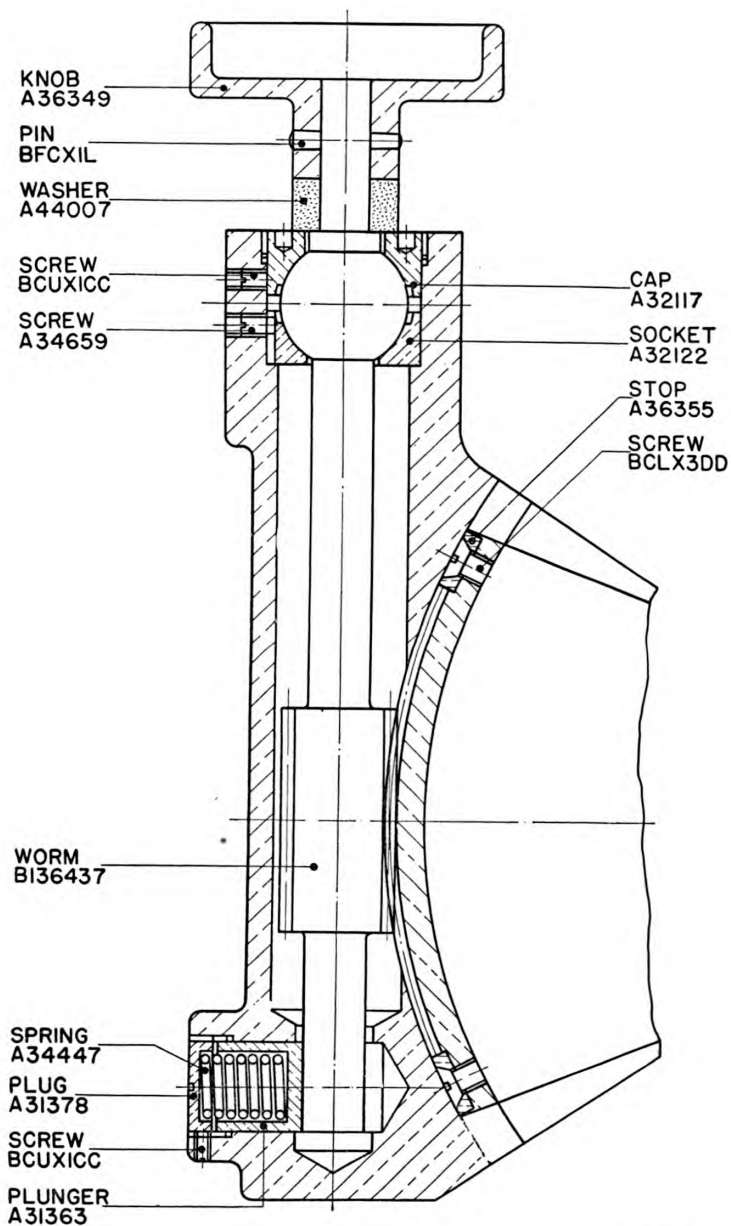


FIGURE 8.—Range quadrant M3—sectioned views.



SECTION E-E

FRA 375-1

FIGURE 9.—Range quadrant M3—sectioned view.

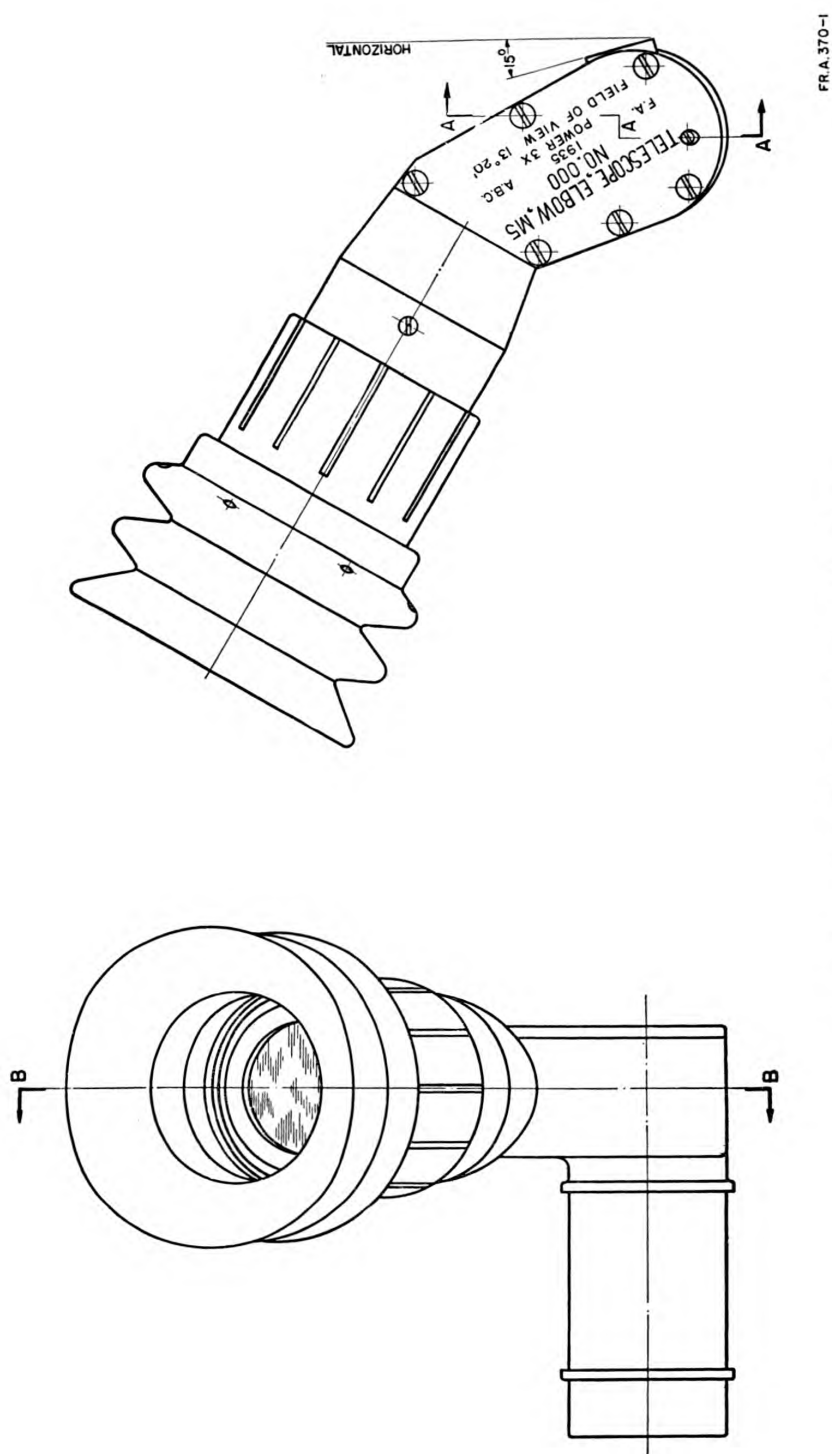
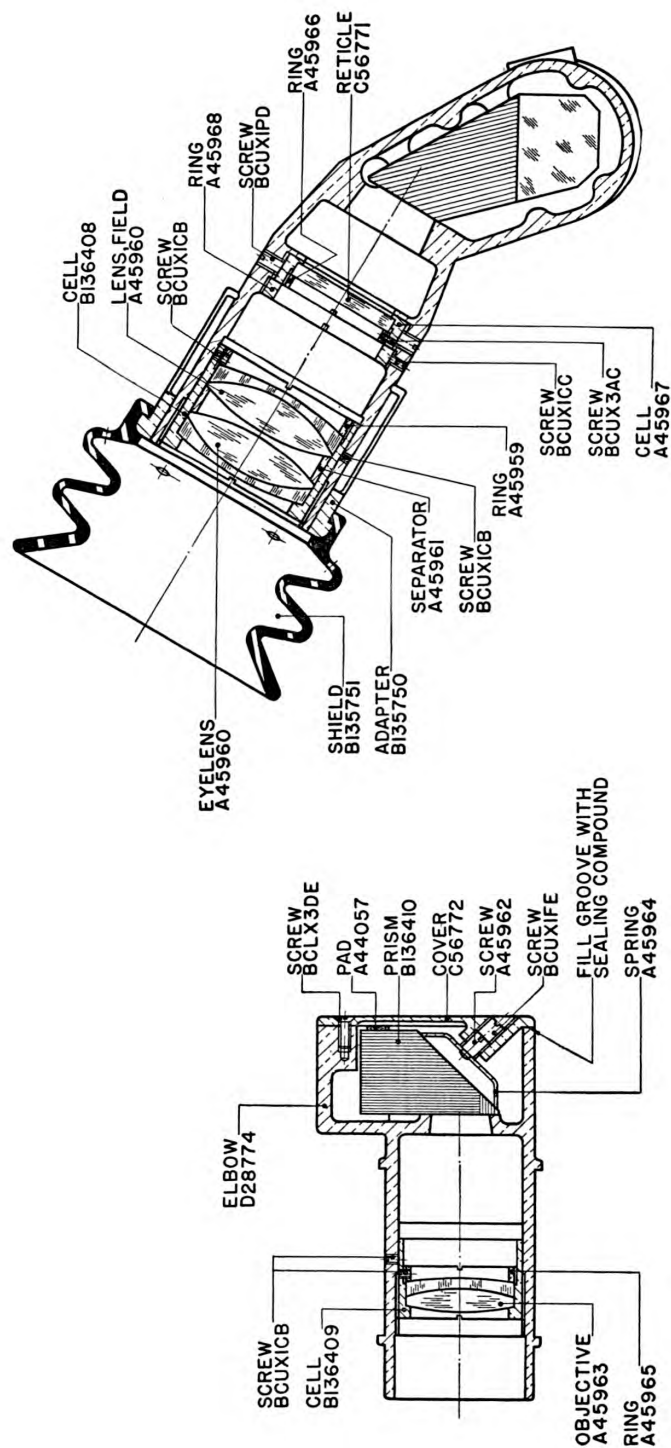


FIGURE 10.—Elbow telescope M5—assembled views.



FRA371-4

SECTION B-B

FIGURE 11.—Elbow telescope M5—sectioned views.

SECTION A-A-A

MOUNT, QUADRANT, AND TELESCOPE

APPENDIX

LIST OF REFERENCES

1. Standard Nomenclature Lists.

Mount, telescope, M16 }
 Quadrant, range, M3 }----- SNL F-169
 Telescope, elbow, M5 }
 Optical repair kit for Field Artillery----- SNL F-21
 Material, cleaning and preserving, and tools used
 therewith ----- SNL K-1
 Current Standard Nomenclature Lists are tabulated
 here. An up-to-date list of SNL's is maintained as
 the "Ordnance Publications for Supply Index"---- (OPSI)

2. Technical Manuals.

Cleaning and preserving materials---- TM 9-850 (now pub-
 lished as TR 1395-A)
 Matériel inspection and repair----- TM 9-1100

[A. G. 062.11 (8-27-41).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

E. S. ADAMS,
Major General,
The Adjutant General.

DISTRIBUTION:

IBn 6, 9 (2) ; IC 9 (4).
 (For explanation of symbols see FM 21-6.)

THE LIBRARY OF THE
DEC 30 1941
UNIVERSITY OF ILLINOIS

